

Material Safety Data Sheet

Section 1. CHEMICAL IDENTIFICATION

| | |
|-----------|--|
| Name: | Tungsten Heavy Alloy |
| Synonyms: | Densimet, Mallory Metal, Densalloy, High Density Tungsten Alloy |
| CAS#: | 7440-33-7 (Tungsten), 7440-02-0 (Nickel), 7440-50-8 (Copper), 7440-48-4 (Cobalt) |

Section 2. COMPOSITION/INGREDIENT INFORMATION

Chemical Family: Refractory Metal Alloy
 Chemical Formulae: WNiFe, WNiCu, WCu, WNiCo, WNiFeCo

| Material | Percentage | OSHA TWA | ACGIH TWA | ACGIH STEL |
|----------|------------|-------------------------------|--------------------------------|-------------------------------|
| Tungsten | 70 to 99 | 5 (insoluble) 1 (soluble) | 5 (insoluble) 1 (soluble) | 10 (insoluble) 3 (soluble) |
| Nickel | 0 to 21 | 1 (insoluble) 1 (soluble) | 1 (insoluble) 0.1 (soluble) | |
| Iron | 0 to 9 | n/a | n/a | n/a |
| Copper | 0 to 25 | 0.1 (fume) 1 (dust & mist) | 0.2 (fume) 1 (dust & mist) | n/a |
| Cobalt | 0 to 4 | 0.1 | 0.05 | 0.02 |

(all exposure limits in mg/m³)

Section 3. HAZARDS IDENTIFICATION

The terms "hazardous" and "hazardous materials" as used within this MSDS should be interpreted as by, and in accordance with, the OSHA Hazard Communication Standard (29CFR1910.1200) including cited appendices, lists, references, etc.

| | |
|--------------------------|--|
| Primary routes of entry: | Inhalation, ingestion, skin or eye contact (for dusts, mist, powder, and fumes) |
| Effects of overexposure: | No specific data, testing, or information has been found for the chemical compounds that comprise these products. However, general comments for individual elements are shown below. |
| Carcinogenic assessment | Cobalt - IARC 2B; Nickel - IARC 2B, NTP2 |

Note IARC 2B - The agent is possibly carcinogenic to humans. This category is generally used for agents for which there is limited evidence in humans in the absence of sufficient evidence in experimental animals. It may also be used when there is inadequate evidence of carcinogenicity in experi-

mental animals. NTP 2 - Substances or groups of substances which may reasonably be anticipated to be carcinogens. "Reasonably anticipated to be carcinogens" defines carcinogens for which there is limited evidence of carcinogenicity in humans and/or sufficient evidence of carcinogenicity in experimental animals.

| | |
|----------|---|
| Tungsten | Industrially this element does not constitute an important health hazard. |
| Nickel | Considered to be a carcinogen by IARC and NTP. Poisonous by ingestion, intratracheal, intraperitoneal, subcutaneous, and intravenous routes. Hypersensitivity to nickel is common and can cause allergic contact dermatitis (nickel itch), pulmonary asthma, and conjunctivitis. |
| Iron | The inhalation of large amounts of iron dust may result in pneumoconiosis (arc welder's lung). |
| Copper | Human systemic effects by ingestion: nausea and vomiting. As the sublimed oxide, copper may be responsible for one form of metal fume fever. Discoloration of the skin is often seen in persons handling copper, but this does not indicate an actual injury. Lung damage after chronic exposure to fumes in the industry has not been described. Copper fumes cause irritation of the upper respiratory tract. |
| Cobalt | Considered possibly carcinogenic to humans by the IARC. Moderately toxic by ingestion. Inhalation of the dust may cause pulmonary damage. The powder may cause dermatitis. |

Section 4. FIRST-AID MEASURES

| | |
|---------------|--|
| Eye contact: | If irritation occurs, flush with large amounts of water for at least 15 minutes. If irritation persists, seek medical attention. |
| Skin contact: | Wash with soap and water. If irritation or rash occurs, thoroughly wash affected area with soap and water and isolate from exposure. If rash persists, seek medical attention. |
| Inhalation: | If large amounts of dust from this substance are inhaled, move the exposed person to fresh air and perform artificial respiration, if necessary. Seek medical attention. |
| Ingestion: | If ingested, get medical attention. Give large amounts of water and induce vomiting. DO NOT MAKE AN UNCONSCIOUS PERSON VOMIT. |
| Other: | In the event of wound contamination with nickel, the wound should be promptly and thoroughly cleaned. All contaminated wounds should be thoroughly cleaned. |

Section 5. FIRE FIGHTING MEASURES

| | |
|----------------------|---|
| Extinguishing Media: | Use Class D fire extinguishing agents (dry powder). |
| Special Procedures: | Use self-contained breather apparatus |
| Unusual Hazard: | Dusts May present a fire or explosion hazard under rare favoring conditions of particle size, dispersion, and strong ignition source. However, this is not expected to be a problem under normal handling conditions. |

Section 6. ACCIDENTAL RELEASE MEASURES

If material is released or spilled, ventilate the area of the spill. Clean up using methods which avoid the generation of dusts. Such methods include wet mopping or vacuuming (assuring that the vacuum is equipped with the proper filter to prevent airborne dust levels which exceed the PEL or TLV). If airborne dust is generated, use the appropriated NIOSH approved respiratory protection.

Section 7. HANDLING AND STORAGE

Tungsten heavy alloys are, in general, safe materials to handle and use under almost all commonly encountered environments. Special precautions typically only apply in situations where the alloy is present as a fine powder or when operations such as machining create dust or soluble by-products. Maintain good housekeeping procedures to prevent the accumulation of dust and the generation of airborne dust particles. Avoid dust inhalation and direct contact with the dust. Wash hands thoroughly before eating or smoking. Wash exposed skin at the end of the work shift. Periodic medical examinations are recommended for individuals regularly exposed to dust or mists.

Section 8. EXPOSURE CONTROL/PERSONAL PROTECTION

| | |
|-------------------------|--|
| Respiratory protection: | Use an appropriate NIOSH approved respirator if airborne dust concentrations exceed the appropriate PEL or TLV. All requirements set forth in 29CFR1910.134 must be met. |
| Protective gloves: | Protective gloves or barrier creams are recommended when contact with dust or mist is likely. Wash thoroughly prior to applying barrier creams or using protective gloves. |
| Ventilation: | Use local exhaust ventilation which is adequate to limit personal exposure to airborne dust to levels which do not exceed the appropriate PEL or TLV. If such equipment is not available, use respiratory protection as specified above. |
| Eye protection: | Goggles or safety glasses with side shields are recommended. |
| Other equipment: | Full body protective clothing is advisable if contact with dust, mist, or fumes are expected. Work clothing should be changed daily if it is suspected that the clothing is contaminated. |

Section 9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|--|---|
| Melting point: | n/a |
| Boiling point: | n/a |
| Vapor pressure: | n/a at 25° C |
| Vapor density (air=1): | n/a |
| Evaporation rate: | n/a |
| Solubility in water: | Insoluble |
| Specific gravity (H ₂ O=1): | 16.7 to 19.3 |
| Molecular weight: | n/a |
| % volatile by volume: | n/a |
| Appearance: | Gray powder, tin-white metal, high copper containing alloys will have a copper sheen. |
| Odor: | None |

Section 10. STABILITY AND REACTIVITY

| | |
|-----------------------------------|--|
| Incompatibilities: | Contact of dust with strong oxidizers may cause fire or explosion. Avoid strong acids. Extremely fine powders may be pyrophoric under some conditions. |
| Stability: | These products are stable. |
| Hazardous decomposition products: | None |
| Hazardous polymerization: | None |

Section 11. TOXICOLOGICAL INFORMATION

Tungsten compounds are considered somewhat toxic. However, the element itself does not constitute an important health hazard. Exposure is related primarily to any dust created. The feeding of 2%, 5%, and 10% of diet as tungsten metal over a period of 70 days has shown no marked effect upon the growth of rats, as measured in terms of weight gain. Heavy exposure to the dust or the ingestion of large amounts of soluble compounds produces changes in body weight, behavior, blood cells, choline esterase activity, and sperm in experimental animals. Nickel and many of its compounds are poisons and carcinogens. All airborne nickel containing dusts are regarded as carcinogenic by inhalation. Ingestion of large doses of nickel compounds (1-3 mg/kg) has been shown to cause intestinal disorders, convulsions, and asphyxia. Hypersensitivity to nickel is common and can cause allergic dermatitis, pulmonary asthma, and conjunctivitis. The most common effect resulting from exposure to nickel compounds is the development of nickel itch. The inhalation of large amounts of iron dust may result in iron pneumoconiosis (arc welder's lung). Chronic exposure to excess levels of iron (>50 to 100 mg per day) can result in pathological deposition of iron in the body tissues, the symptoms of which are fibrosis of the pancreas, diabetes mellitus, and liver cirrhosis. Cobalt is considered possibly carcinogenic to humans by the IARC. Cobalt is moderately toxic by ingestion. Inhalation of cobalt dust may cause pulmonary damage. Exposure to cobalt powder may cause dermatitis.

Section 12. ECOLOGICAL INFORMATION (not available at this time)

Section 13. DISPOSAL CONSIDERATIONS

This material must be disposed of in accordance with any and all applicable local, state, and federal regulations. Material intended for disposal may be sold for scrap for reclaim.

Section 14. TRANSPORT INFORMATION

There are no special DOT regulations pertaining to the material when shipped in solid form.

Section 15. REGULATORY INFORMATION

This product may be subject to the reporting requirements of section 313 of SARA Title III if the following de minimis concentrations are exceeded:

| Substance | de minimus concentration |
|-----------|--------------------------|
| Cobalt | 1.0 |
| Copper | 1.0 |
| Nickel | 0.1 |

See 40 CFR 372 for reporting requirements

Section 16. OTHER INFORMATION

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. Midwest Tungsten Service, Inc. shall not be held liable for any damage resulting from the handling or from contact with the products mentioned above. Any comments or questions should be directed toward your health and safety advisor or:

Midwest Tungsten Service
7101 S. Adams Street, #6
Willowbrook, IL 60527